CLAIMS

1. (Amended) An OTDM transmission method for implementing distortion-free transmission, wherein

a transform-limited pulse having an exact spectral width with respect to the time-domain waveform is used as an optical time-division multiplexed (OTDM) signal pulse train;

the OTDM signal pulse train is converted to a spectrum sequence of wavelength division multiplexed (WDM) signal by means of an optical Fourier transform circuit for converting an optical pulse waveform in the time domain to the frequency spectral profile of the pulse;

the converted optical pulse train is incident on an optical fiber transmission line;

the WDM signal spectral sequence after transmission in the optical fiber transmission line is converted to an OTDM signal pulse train by means of an optical inverse Fourier transform circuit for receiving an optical pulse train incident on the optical fiber transmission line and transmitted in the optical fiber transmission line and converting the frequency spectral profile to the optical pulse waveform of the pulse in the time domain, to regenerate the time-domain waveform of the OTDM signal pulse train before transmission; and

the frequency spectral profile is maintained even if the transmitted optical pulse receives any linear time distortion in the optical fiber transmission line.

2. An OTDM transmission method according to Claim 1,

wherein the optical Fourier transform circuit comprises a phase modulator driven by a repetition frequency of 1/N of the transmission rate of the OTDM signal pulse train (N is an integer) and a dispersion element for giving group-velocity dispersion; and

a train of N-channel OTDM signal pulses is converted to a sequence of N-channel WDM signal spectrums.

3. An OTDM transmission method according to Claim 1 or 2, wherein the repetition frequency R of the optical pulse train before multiplexing is used as a driving frequency for an optical Fourier transform when an OTDM signal pulse train having a repetition frequency nR as a result of multiplexing of n times is used for the repetition frequency R of the optical pulse train before multiplexing to the OTDM signal pulse train.

4. An OTDM transmission method according to Claim 1, wherein the tolerance of the optical transmission signal with respect to either or both of dispersion and polarization-mode dispersion is increased by increasing the effective time width of the optical Fourier transform sufficiently in comparison with the time width of the input optical pulse train.

5. An OTDM transmission method according to Claim 1, wherein a dispersion element and a phase modulator of the optical inverse Fourier transform circuit on a receiver side use the completely inverted signs of those used in the optical Fourier transform circuit on a transmitter side.

6. (Amended) An OTDM transmission method according to Claim 1, wherein the optical inverse Fourier transform circuit comprises a phase modulator for applying phase modulation to each optical pulse in synchronization with the optical pulse train and a dispersion element for giving group-velocity dispersion; and a clock signal is regenerated on the basis of a beat signal corresponding to a difference in frequency between adjacent wavelength channels of the received WDM signal, and the phase

modulator is driven by the repetition frequency of 1/N of the clock-signal frequency.

7. (deleted)

8. (deleted)